REMARKS

In view of the following discussion, Applicants submit that claims 72-75, 77, 78, 80-108, 111, 112, 114-140 and 142 are directed to statutory subject matter under the provisions of 35 U.S.C. §101, and they comply with the requirements of 35 U.S.C. §112. Thus, Applicants believe that these claims are in condition for allowance.

I. REJECTION OF CLAIMS 72-75, 77, 78, 80-108, 111, 112, 114-140 AND 142 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

The Examiner has rejected claims 72-75, 77, 78, 80-108, 111, 112, 114-140 and 142 under 35 U.S.C. §112, first paragraph.

The Examiner states that "while the specification discloses a method using a mHMM (the match Hidden Markov Model or integrated HMM), it does not contemplate a more general hidden Markov Model for identifying similar biopolymers." In response, Applicants submit that a general hidden Markov Model for identifying similar biopolymers is supported at page 3, lines 15-17, where "the model, such as a hidden Markov Model can express a probability that the given set of sequences is a set of sequences of the model" (emphasis added). This support for the hidden Markov Model is further evidenced by the section entitled "Hidden Markov Models" on pages 18-20 in contrast with the section entitled "Integrated Hidden Markov Model" on pages 20-21. The statement in the specification on page 10 that "the match Hidden Markov Model (mHMM or "integrated HMM") is one (emphasis added) implementation of the above model" fails to limit all implementations to that particular model.

Further, the Examiner states that limitations such as:

> a set of known sequences that correspond to defined regions of a set of biopolymer sequences to provide a characteristic topological pattern of match states between the biopolymer sequences, each match state characterized by a scoring matrix, wherein the scoring matrix for a first match state defines a state of similarity for a conserved region of the biopolymer sequences and the scoring matrix

for a second match state defines a state of dissimilarity for a divergent region of the biopolymer sequences,

are not supported. In response, Applicants submit that at least pages 8-11 and Figures 1 and 4 provide support for the claim limitation. Specifically, "the model represents a set 150 of sequences" and "indicates different states of matching at different defined positions," (*i.e.*, a characteristic topological pattern of match states). Further, "similarity, profile and dissimilarity are three different match states." In Figure 4, "modules that represent respective regions of a set of biopolymer sequences are linked to represent the topology of a prohormone" and are linked in an order "that corresponds to the organization of biological features" that include "a conserved region" and "a divergent region."

The Examiner further states that "while Figure 4 has a label for a conserved and divergent region of a particular protein, there are other states ("profile," see also page 9 of the specification)." Additionally, the Examiner states "the claim recites a first and second match state, but Figure 4 shows more than two." In response, Applicants submit that there is no requirement to include every feature illustrated in a figure in each claim. *See*, MPEP § 2164.08 and Raytheon Co. v. Roper Corp., 724 F.2d 951, 957 (Fed. Cir. 1983). Furthermore, claim 2 as originally filed and the example discussed on page 14, line 14, through page 15, line 8, illustrate that a profile state is not mandatory and that having as few as two match states (*i.e.*, similarity and dissimilarity) were all contemplated at the time of filing.

Additionally, the Examiner states that "the specification does not define what is considered conserved and divergent for a generic sequence." In response, Applicants submit that according to the Merriam-Webster Online Dictionary at http://www.m-w.com the term "conserve" means "to maintain (a quantity) constant during a process of chemical, physical, or evolutionary change." This dictionary definition is consistent

with the description in the specification at page 10, lines 27-28, which states that regions of similarity are "indicative of conservation during the course of evolution, whereas dissimilarity is indicative of divergence." Accordingly, what is considered conserved and divergent for a generic sequence is defined regardless of the reason that the region is conserved or divergent.

The Examiner additionally states that "the claims embrace linking modules in any order, and the modules are not required to reflect biological features." Further, the Examiner states that, "as described in the specification, the match state is predicated on what is known or believed about the respective region." In response, Applicants first submit that the claims are interpreted in light of the specification without necessitating that everything in the specification be recited in the claims. Raytheon Co. v. Roper Corp., 724 F.2d 951, 957 (Fed. Cir. 1983). In addition, Applicants submit that a model of "a set of known sequences that correspond to defined regions of a set of biopolymer sequences to provide a characteristic topological pattern of match states between the biopolymer sequences" defines a configuration of the model, which includes one or more modules, as recited in the claims. The match state as claimed is also predicated on what is known about the respective region since the match state defines a state for either a conserved or divergent region of the biopolymer sequences.

Finally, the Examiner states that "while a computer-readable medium having stored instructions which cause a processor to perform method steps is seen, the concept of a "plurality of instructions including" these is not seen." In response, Applicants submit that the specification at page 16, lines 22-24, states that "... and method actions can be performed by a programmable processor executing a program of instructions to perform functions of the invention by operating on input data and generating output" (emphasis added). This section of the specification

does not repeat the acts of the methods according to the embodiments of the invention. However, the "method actions" references the claimed instructions since these instructions are substantially analogous to the acts in the method claims, which are supported by the specification (*see*, discussion heretofore).

Therefore, Applicants submit that the claims contain subject matter which is described in the specification in such a was as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

II. REJECTION OF CLAIMS 72-75, 77, 78, 80-108, 111, 112 AND 114-140 UNDER 35 U.S.C. § 101

The Examiner has rejected claims 72-75, 77, 78, 80-108, 111, 112 and 114-140 under 35 U.S.C. §101 as being directed to non-statutory subject matter.

The dispositive inquiry is whether the claim as a whole is directed to statutory subject matter. State St. Bank & Trust Co. v. Signature Fin. Group, 149 F.3d 1368, 1375 (Fed. Cir. 1998). It is irrelevant that a claim may contain, as part of the whole, subject matter which would not be patentable by itself. Id. Certain types of mathematical subject matter, standing alone, represent one type of unpantentable subject matter until reduced to some type of practical application, *i.e.*, a useful, concrete and tangible result. Id. at 1373.

Applicants have claimed a method of identifying similar biopolymer sequences and presented reasons in their Response to the previous Office Action why this method produces a useful, specific, concrete and tangible result. This result is embodied by the claim limitation of "determining a likelihood that the set of biopolymer sequences is represented by the model and thereby similar biopolymers based on the score." In an attempt to rebut the reasons previously set forth by the Applicants that the method claims recite acts for a practical application, the Examiner states that the claims lack

limitations to known, characterized sequences without denying that the acts and result can provide a practical application. In other words, the Examiner has suggested that the claimed method (like most methods) could be applied in a manner that is not useful.

Further, the acts of the claimed method do not consist solely of a process that manipulates only numbers, abstract concepts or ideas, or signals representing any of the foregoing. *See,* MPEP §2106(IV)(B)(1). Rather, the act of "comparing the set of biopolymer sequences to the statistical model by evaluating the scoring matrices of the match states to provide an output score" is a manipulation of data representing physical objects (*i.e.*, the biopolymer sequences). *See,* MPEP §2106(IV)(B)(2)(b)(i). Therefore, the method claims are a statutory process that requires the measurements of physical objects.

For the foregoing reasons, Applicants submit that identifying similarity between biopolymers is a useful invention patentable under 35 U.S.C. § 101. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

III. REJECTION OF CLAIMS 72-75, 77, 78, 80-108, 111, 112, 114-140 AND 142 UNDER 35 U.S.C. § 112

The Examiner has rejected claims 72-75, 77, 78, 80-108, 111, 112, 114-140 and 142 under 35 U.S.C. §112, second paragraph. The Examiner states that the phrase "and thereby similar biopolymers based on the score" is grammatically confusing an unclear.

Applicants submit that the phrase is grammatically correct. Further, the limitation clearly identifies the concept of the invention as set forth in the specification on page 10, lines 16-21. The overall likelihood that the set of sequences are represented by the model is given by the score representing the likelihood that the sequences of the set are similar. In other words, "a likelihood that the set of biopolymer sequences is represented by the model and thereby similar biopolymers" is based on the score, as recited in the claims. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

Conclusion

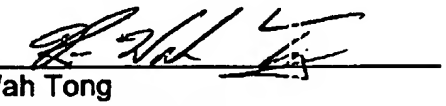
Applicants submit that all of these claims fully satisfy the requirements of 35 U.S.C. §§101 and 112. Consequently, the Applicants believe that all the claims are presently in condition for allowance. Thus, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there remains unresolved issues, it is requested that the Examiner grant Applicants a telephone interview by contacting the undersigned at (732) 530-9404 so that such issues are resolved as expeditiously as possible.

If these papers are not considered timely filed by the United States Patent and Trademark Office, or if any additional fees are required, kindly charge that fee to Deposit Account No. 20-0782.

Respectfully submitted,

Date: 8/9/05



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